HISTORICAL WATER SUSTAINABILITY:
A CASE STUDY OF THE PHAD IRRIGATION
SYSTEM OF MAHARASHTRA STATE, INDIA

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Historical evidences of sustainable irrigation systems in India

• Community managed traditional sustainable irrigation systems are found all over India.
• In the fourth century (BC) Chanakya the author of “Arthashastra (Economics)” reported that assistance were given to farmers to manage irrigation system.
• In Tamil Nadu the Chola King Karikala built annicut on the River Cauvery in first century (BC).
• Vijay Nagar Empire of Karnataka State constructed diversion weirs and canals during 13-16th Century.

Historical evidences of sustainable irrigation systems in India

• Himachal Pradesh had an ancient system called “Kuhl”.
• In the hilly regions of Uttar Pradesh, Haryana and Rajasthan also tradition of farmers managing diversion streams “Johads” was found.
• Community managed irrigation systems “Ahar Pyne” in Bihar and “Apatani” in Arunachal Pradesh.
• In Maharashtra traditional sustainable community managed “Phad System” and “Malgujari Tank System” existed for last 300 to 400 years ago.

Sustainable PHAD (Block) Irrigation System

In the North – West part of Maharashtra, there are a number of community managed small scale irrigation schemes in the Tapi basin. These are popularly known as “Phad Systems”

History of PHAD Irrigation system

• Rich historical tradition of community managed sustainable irrigation systems in India.
• Some of these systems are so old that it is impossible to establish their antiquity.
• Phad irrigation system has been in practice since the time of Mouryas rule over Khandesh (NW Maharashtra)(300 BC).
• Phad system received patronage in the tenure of kings of Yadavas (around 1000 years back).
• Queen Ahilyabai Holkar strengthened this system in the 18th Century.

Different components of The PHAD system

WEIR (BANDHARA)
Number of Weirs and Area Irrigated:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>River</th>
<th>District</th>
<th>No. of Weirs</th>
<th>Command Area (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pangra</td>
<td>Dhule</td>
<td>30</td>
<td>3594</td>
</tr>
<tr>
<td>2</td>
<td>Mosam</td>
<td>Nashik</td>
<td>20</td>
<td>1500</td>
</tr>
<tr>
<td>3</td>
<td>Aram</td>
<td>Nashik</td>
<td>08</td>
<td>275</td>
</tr>
<tr>
<td>4</td>
<td>Girna</td>
<td>Nashik</td>
<td>08</td>
<td>300</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>66</td>
<td>5569</td>
</tr>
</tbody>
</table>
The length of these canals varies from 2 km to 12 km:

**Canals**

The Irrigated command is usually divided into 4 blocks called Phads.
- The size of a phad can vary from 10 ha to 300 ha, the average being 100ha-125 ha.
- Each Phad has varied number of beneficiaries.
- Division and size of phads depends on topography and physical boundaries viz. natural depression, nallas (rivers), roads, etc.
- Common layout of the phads is given below:

**Number of PHADs (Blocks)**
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**Crop Rotation in PHAD**

**Management in the PHAD**
- The PHAD system of irrigation is entirely managed by the community.
- Every village has an effective system of management.
- A village level committee is formed by the irrigators.
- **Functions of Committee:**
  - Protect, supervise, and administer the irrigation system.
  - Employ Supervisors, Canal Inspectors and Water Guards for irrigation.
  - Solve disputes and impose fine on the offenders.
  - Decide the cropping pattern.
  - Decide sequence of irrigation of the fields in a Phad.
  - Call an annual general body meeting.

**Cropping System**

<table>
<thead>
<tr>
<th>Year</th>
<th>Phad I</th>
<th>Phad II</th>
<th>Phad III</th>
<th>Phad IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Sugarcane (Ratoon)</td>
<td>Sugarcane (New)</td>
<td>Wheat</td>
<td>Gram</td>
</tr>
<tr>
<td>II</td>
<td>Gram</td>
<td>Sugarcane (Ratoon)</td>
<td>Sugarcane (New)</td>
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<td>Sugarcane (Ratoon)</td>
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<td>IV</td>
<td>Sugarcane (New)</td>
<td>Wheat</td>
<td>Gram</td>
<td>Sugarcane (Ratoon)</td>
</tr>
</tbody>
</table>

**Functions of Irrigators**
- Elect the committee members and decide the chair person.
- Maintain the field channels and distributaries.
- The operations like tillage, sowing, removing weeds from the fields, applying fertilizers, applying pesticides and harvesting are to be done by the irrigators.
- Take only that type of crop which is decided by the committee.
Relevance of PHAD Irrigation system in the 21st century

- Community Managed Irrigation System
- Collective Maintenance
- Equity
- Sustainability
- Flexibility
- Conservation of land

Conclusions

- Phad System is the best historical example of the community managed sustainable irrigation system.
- Phad irrigation system can be set as a good example of equitable distribution of available water and its proper management.
- The Phad system shows that small farmers can organize themselves and can promote a sustainable irrigation system.
- Crops are rotated from one Phad to another, so that land neither gets water logged nor gets saline.

Conclusions

- Water distribution practice and the management rules are so framed that they sustain for a long period.
- Phad irrigation system has relevance even today for providing predictable, reliable and equitable water to farming community for maintaining sustainability in agriculture.
- The farmers share, both prosperity and distress equitably.
- Up-gradation and modernization is needed under changing environment.